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This is a U.S. Patent Application for:

TITLE: **SYSTEM AND METHOD FOR AUTOMATIC MOBILE DEVICE ACTIVATION**

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SYSTEM AND METHOD FOR AUTOMATIC MOBILE DEVICE ACTIVATION

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

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The present invention relates to telecommunications devices and, in particular, to an improved system and method for mobile device activation.

DESCRIPTION OF THE RELATED ART

10   Cellular telephones are typically shipped from factory or other remote location deactivated. This ensures that the telephones cannot be intercepted en route and used, with the owner's account being charged for the usage. To activate the telephone, the user must typically call a customer service number or press a key on the telephone which connects the telephone to customer

15   service. The customer service center is typically located at a centralized location. The user then provides information such as the telephone serial number and a billing address, and receives a telephone number assigned to the phone. The telephone network then updates its databases with the new information.

20   However, before the user can use the telephone, he must wait for the database changes to propagate from the customer service center through all the switches in the network, or at least until switch or switches local to the user are updated. As can be appreciated, this can take a considerable period (on the order of several hours), particularly since the updates usually are

25   batched and only periodically sent out throughout the network.

As such, there is a need for an improved system for activating a cellular telephone. There is a further need for an improved method for propagating cellular telephone activation update changes through a cellular telephone network.

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SUMMARY OF THE INVENTION

These and other drawbacks in the prior art are overcome in large part by a system and method according to the present invention.

A method according to an embodiment of the present invention includes providing a user with a personal identification number upon purchase of the cell phone. The cell phone then ships, while the cellular network activates the telephone in a preactivation mode. In the preactivation mode,

5   the cellular telephone's telephone number, the PIN, and other activation information, such as the telephone serial number, propagate out from a central switching center, such as the customer service center. When the customer receives the telephone, he turns it on. This is detected by the local switch, which accesses its (or an associated) database to determine that the

10   telephone is in preactivation mode. Next, the switch sends this information to a PIN Collection Unit, such as an interactive voice response (IVR) unit, where the PIN is collected. If the PIN is entered correctly, the PIN Collection unit informs the switch's database which puts the telephone into a fully active mode. The telephone is then ready for use within the switch's service area,

15   i.e., the user can make telephone calls. The switch then sends the fully activated update message to other switch databases in the network. Later, if the user travels outside his switch area of service, the telephone will be functional.

A network switch according to an embodiment of the present invention

20   includes a controller, a switch database for storing preactivation information for purchased telephones, and a personal identification number (PIN) collection unit coupled to the controller for receiving PINs from telephone purchasers. The switch database receives the preactivation information from the central service or control enter. The preactivation information includes a

25   PIN that is stored in the PIN collection unit. If the purchaser switches on the telephone in the region serviced by the switch, the switch activates the PIN collection unit. The PIN collection unit receives the input PIN and, if entered correctly, informs the controller, which puts the telephone into a fully activated mode in the database. The controller further sends the activation information

30   on to other switch databases and the central control center.

A method according to an embodiment of the present invention includes receiving a personal identification number (PIN) and other

preactivation information at a central service center, propagating the preactivation information to switch databases within the network, and storing the PIN in a PIN collection unit. The method further includes detecting a telephone, receiving the PIN at the PIN collection unit from a telephone, and

5   updating the switch database responsive to receiving the PIN. Finally, the method includes activating the telephone and propagating the activation data to other switch databases or the central service center.

A telecommunications network according to an embodiment of the present invention includes a central service center for maintaining a master

10   system database and propagating to switch databases preactivation information. Local switches include or are operably coupled to switch databases and PIN collection units. The central service center is adapted to receive a PIN and preactivation information, and then propagate this information to the local switch databases. The local switches, associated

15   databases and PIN collection units, are adapted to detect a power on of a cellular telephone, receive and check a PIN, and activate to allow service to the telephone. The local switches are further adapted to transmit the activation information to either the central master database (which will then transmit to other switches) or to propagate the activation information to other

20   switch databases itself.

BRIEF DESCRIPTION OF THE DRAWINGS

A better understanding of the invention is obtained when the following detailed description is considered in conjunction with the following drawings in

25   which:

FIG. 1 is a block diagram of a telecommunications system according to an embodiment of the present invention;

FIG. 2 is a block diagram of a telecommunications central control center according to an embodiment of the present invention;

30   FIG. 3 is a block diagram of a telecommunications switch according to an embodiment of the present invention;

FIG. 4 is a flowchart illustrating operation of an embodiment of the

present invention;

FIG. 5 is a flowchart illustrating operation of an embodiment of the present invention;

FIG. 6 is a diagram illustrating signaling according to an embodiment of

5   the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Turning now to the drawings and, with particular attention to FIG. 1, a diagram of a telecommunications system 100 according to an embodiment of

10   the present invention is shown. The telecommunications system 100 is representative of, for example, a nationwide cellular telephone network, such as a GSM, DECT, or other cellular network.

As shown, the network 100 includes a plurality of local networks 102, 104, 106, 108, 110, serviced by local switches 114a-114e. The local switches

15   may include one or more control processors (not shown) and provide switching functions to a plurality of cells within the local networks, as is well known; basic local switches are available from a variety of manufacturers. The local networks 102a-102e typically further include a plurality of base stations 116a-116e, 118a-118e, also available from a variety of

20   manufacturers. The base stations 116a-116e, 118a-118e provide antennas and associated equipment for receiving signals from cellular telephones 120 within cells. The base stations 116a-116e, 118a-118e further include equipment to transmit signals between the cellular phones 120 and the local switches 114a-114e. The local switches 114a-114e in turn couple to central

25   offices (not shown) and, ultimately, to a central customer service center 112.

As will be explained in greater detail below, according to embodiments of the present invention, the central service center 112 maintains a master database of active users 122. The central service center 112 further maintains a database 124 of preactivation information and passwords for

30   users whose cellular telephones have not been fully activated. Further, the central service center 112 maintains various equipment for receiving and transmitting updates to the various databases.

The local switches 114a-e similarly maintain a database of active users 126a-e, respectively, and a database of preactivation information 128a-e, respectively, propagated from the central service center 112, as will be explained in greater detail below. The local switches 114a-e may each further
5   include password collection units 130 (only one of which is shown) which are used to receive and verify password information during final activation.

In operation, a password or personal identification number (PIN) is assigned to a new cellular telephone at a point of sale, such as Internet, etc. The password and associated preactivation information are sent to the central
10   service center 112 and stored in the preactivation database 124. The central service center 112 then sends the preactivation information, including the password, to the local switches in the network. The preactivation information is stored in the local preactivation database 124. Then, when the user switches the cellular telephone on, the local switch detects the power on and
15   also determines that the telephone is preactivated. The user can then submit the password to the password collection unit 130, which compares the received password with the one in its database. If verified, then the local switch activates the cellular telephone, i.e., is able to accept communication from the phone. The local switch then updates its preactivation database 128,
20   and its activation database 126 to include the now-active telephone. Further, the local switch transmits the new activation information to the other local switches or the central service center. The other components in the system then update their databases so that the cellular telephone will function in their regions.

25   FIG. 2 is a block diagram of an exemplary central service center according to an embodiment of the present invention. Central service centers suitable for use in conjunction with the present invention are available from a variety of manufacturers. As shown, the central service center 112 includes a central controller 202, an active user database 122, a preactivation database
30   124, and a plurality of input/output ports 204. The central controller 202 may be implemented as various combinations of hardware, software, and firmware, including, for example, microprocessors, microcontrollers, or

application specific integrated circuits. The central controller 202 supervises the reception of activation and preactivation data over the input/output ports 204 and their storage in the databases 122, 124. The databases 122, 124 may be implemented in one or more mass storage devices, such as magnetic

5   disk drives, and the like.

The central controller 202 further supervises the transmission to the local switches 114 of the preactivation information and, in certain embodiments, the activation information. In particular, the central service center 112 receives password and preactivation information from or at a point

10   of sale. The preactivation information includes, for example, a password or PIN, and an identification of the telephone, such as a serial number, as well as purchaser and billing information. Once received, the preactivation information is stored in the preactivation database 124 and propagated to the local switches.

15   Similarly, the activation information is received at the central switching center 112, either directly from the local switch 114 which originally receives it, or through propagation from another local switch. If directly received from the local switch, the central service center 112 forwards the update to the other local switches.

20   FIG. 3 is a block diagram of an exemplary local switch 114 according to an embodiment of the present invention. As shown, the local switch 114 includes a local controller 302, a local database 304, and a password collection unit 306. It is noted that, while shown as a single unit, in practice, the password collection unit 306 and local database 304 may be shared

25   among several local switches. Thus, the figure is exemplary only.

The local controller 202 may be implemented as various combinations of hardware, software, and firmware, including, for example, microprocessors, microcontrollers, or application specific integrated circuits, as well as associated memory. The local database 304 implements the activation

30   database 126 and the preactivation database 128. The password collection unit 306 may be implemented to include a known interactive voice response unit and is adapted to receive the user's password and check it with the

information stored in the preactivation database 128, as will be described in greater detail below.

More particularly, the activation database 126 stores information regarding active cellular telephones while the preactivation database 128

5 stores preactivation information that has been sent from the central service center 112. As will be explained in greater detail below, the activation database 126 may also be updated from the central service center 112. In addition, the activation database 126 may be updated locally. For example, if a cellular telephone in the region serviced by the switch powers on, the switch

10 114 detects it, determines whether the telephone is present in the activation database 126 or the preactivation database 128. If in the preactivation database 128, the switch 114 waits for the password to be provided. If the password is verified, then the cellular telephone is activated, the cellular telephone is removed from the preactivation database 128 to the activation

15 database 126, and the rest of the network switches 114 and the central service center 112 are informed of the update.

Turning now to FIG. 4, a flowchart illustrating operation of an embodiment of the present invention is shown. In a step 402, a password or personal identification number (PIN) is associated with a particular cellular

20 telephone. For example, this may occur at a point of purchase or sale, or the password may have been pre-set with the telephone. In step 404, the preactivation information is provided to the central service center 112 and the local switches 114. Thus, for example, the preactivation information may include the password and telephone and user identification, as well as billing

25 information. The preactivation information may be provided directly to the central service center 112, which then propagates the preactivation information to the local switches 114. When the information is received at the preactivation databases 124, 128, they are updated with the new information.

In step 406 a local switch 114 detects a power on of a cellular

30 telephone and checks the activation and preactivation databases 126, 128. The cellular telephone is detected as not activated in step 408 if it is present in the preactivation database 128 or if present in neither database. In step

410, the local switch 114 receives the password or PIN at the password collection unit 306. In particular, the password collection unit 306 receives the password and accesses the preactivation database 128. The local switch 114 then verifies the password. Once the password is verified, in step 412, the

5   activation database 126 is updated with the new information and the telephone is able to be used in the area serviced by the local switch 114. The updated activation database information is then propagated to the other local switches and the central service center 112, in step 414. In certain embodiments, the update information is provided or transmitted directly to the

10   central service center 112, which then propagates the update to the other local switches 114. In other embodiments, the update information is propagated to the other local switches from the updating local switch itself.

Turning now to FIG. 5, a flowchart illustrating operation of an embodiment of the present invention is shown. In step 502 a user receives or

15   assigns a PIN or password at a time of purchase. In step 504, the user then powers on the cellular telephone. In step 506, the user enters the password. If the password and the preactivation information have been received at the local switch, and the password is verified, then the cellular telephone becomes operational in the region serviced by the switch.

20   FIG. 6 is a diagram illustrating signal flow according to an embodiment of the present invention. Shown are an exemplary sale point 602, the central database 112, a local switch 114a, and a local switch 114b. It is noted that in practice, more than one sale point and two local switches likely would be employed. Thus, FIG. 6 is exemplary only.

25   As shown, in 604, preactivation information is provided from a sale point 602 to the central database 112. The sale point 602 may be, for example, an Internet retailer, physical retailer, and the like. Moreover, while referring generally to initial sales, the teachings of the present invention apply equally to manufacturers distribution centers after, for example, warranty

30   service. Preactivation information can include, for example, password, serial number, and billing information.

Once the preactivation information has been received at the central service center 112 and used to update its master database, the central service center 112 propagates the information to the local switches 114, at 606. The information can either be broadcast or relayed to the various local

5   switches. The local switches 114 use the information to update their databases 128 of preactivation information.

Then, after the cellular telephone is delivered, the user powers it on, at 608. In the example illustrated, the cellular telephone is present in the region serviced by the local switch 114b. As such, the local switch 114b detects the

10   power on. The local switch 114b then determines by accessing its local databases 126b, 128b (FIG. 1) that the cellular telephone is in preactivation mode. The local switch 114b thus does not allow service to the cellular telephone. Next, at 610, the local switch 114b receives the password from the cellular user, such as via the password collection unit 306, which may be

15   an IVR system.

Once the password is verified, the local switch 114b updates its database and transmits the updates to the other switches or the central service center at 612.

The invention described in the above detailed description is not

20   intended to be limited to the specific form set forth herein, but is intended to cover such alternatives, modifications and equivalents as can reasonably be included within the spirit and scope of the appended claims.